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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,541	05/26/2005	Keikhosrow Irani	P-1560PCT/US	9899

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EXAMINER	
BOOSALIS, FANI POLYZOS	
ART UNIT	PAPER NUMBER
2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 10/536,541	Applicant(s) IRANI, KEIKHOSROW
	Examiner Faye Boosalis	Art Unit 2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 26 May 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-18 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 26 May 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2 and 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Marshall et al (US 6,515,285 B1)* in view of *Ariessohn et al (US RE 33,857)* and *Cole et al (US RE37,146 E).*

Regarding claim 1, Marshall discloses a device for thermal imaging of target surface(s) having different temperatures within a range of temperatures of interest (col. 36, lines 9-16), the thermal imaging taking place through intervening media having a known transmission wavelength, the target surface(s) having a known absorptive wavelength (Fig. 1A and col. 6, lines 11-17), comprising: (a) a housing (76) including an opening (i.e. window) (88) for admitting infrared rays including those emanating from the target surface(s) (200), the rays directed along an optical path within the housing, the optical path having an optical axis; (b) an optical assembly (106) positioned within the housing (76) and in the optical path, the optical assembly having an input and output, the infrared rays (241) directed towards and into the input, through the out of the output of the optical assembly (See Fig. 1A and col. 11, lines 35-53); (c) means for optimizing the spectral band width of the optical assembly to 3 um to 14 um (col. 31, lines 30-48); (d) an un-cooled focal plane array (102), infrared ray detector (UFPA) including a

detecting surface, the UFPA detector positioned in the housing and in the optical path so as to allow the impingement of the infrared rays passing out of the optical assembly onto the detecting surface (See Fig. 1D and col. 10, lines 34-53); (e) means for optimizing the spectral band width of the UFPA detector to 3 um to 14 um (col. 31, lines 30-48); said UFPA detector providing an electrical output proportional to the energy of the infrared rays impinging onto the detecting surface (See Fig. 1D and col. 10, lines 34-53); (filtering means (236) including a first and second infrared band pass filter, the first infrared band pass filter having a spectral band width of 8 to 14 um, the second infrared band pass filter having a respective spectral band width within 3 to 8 um (col. 31, lines 30-48), each of the band pass filters removably interposed in the optical path upon direction of an operator for filtering the infrared rays entering the housing so as to attenuate certain infrared rays and to pass other infrared rays of particular, respective predetermined wavelengths associated with the range of temperatures of interest, the transmission wavelength of the intervening media and the absorptive wavelength of the target surface(s) (col. 39, lines 33-42); and (g) electronic means (116) adapted to convert the electrical output into at least one interpretable output whereby an operator is presented with information sufficient to determine the temperature(s) of the target surface(s) within an acceptable degree of accuracy (See Figs. 28A-28C and col. 34, lines 7-31). Marshall does not disclose a specific range of temperature of interest. Ariessohn discloses an apparatus of imaging hot infrared emitting surfaces comprising: thermal imaging of target surfaces having different temperatures within a range of temperatures of interest of 1100-1300 degrees Celsius. Ariessohn teaches a number of

imaging systems have been developed for viewing interiors of closed, hot vessels other than recovery boilers, to determine some internal characteristics or conditions. In recovery boiler, typical smelt bed temperatures are about 1000 degrees Celsius with overlying combustion gases at temperatures of 1100 to 1300 degrees Celsius (col. 2, lines 50-60). Cole discloses an array for projecting thermal images comprising a large operating temperature range via: low negative thermal coefficient or resistance in the 20-650 degree Kelvin temperature range (col. 2, lines 24-36). Cole teaches a large operating temperature range via: low negative thermal coefficient of resistance (TCR) in the 20-650 degree Kelvin temperature range is ideally suited to a drive mode of projection driven by electrical current, the pixel resistance of about 40 kOhms provides optimal heating at low electrical current levels, and the emitter material has a resistance of about 1 kOhm per square, thereby permitting use of a 40 square serpentine pattern which fits into the small pixel geometry (col. 2, lines 24-36). Therefore, it would have been obvious to modify the device disclosed by Marshall to include a temperature ranging between a negative temperature range, as disclosed supra by Cole, to a high positive temperature range as disclosed supra by Ariessohn, to allow for a more efficient means for thermal imaging of target surface(s) depending on the overall interests of the target surface(s).

Regarding claim 2, Marshall discloses the device for thermal imaging of target surface(s) having different temperatures within the optical assembly includes an objective lens, a negative lens and focusing lens means (col. 11, lines 47-53 and col. 34, lines 50-67).

Regarding claims 6-9, Marshall discloses the device for thermal imaging of target surface(s) having different temperatures within a range of temperatures of interest wherein the means for optimizing the spectral band width of UFPA detector to 3 um to 14 um includes spectral transmission window (88) positioned in the optical path between the output and the detecting surface, the spectral transmission window having a spectral band with of 3 um to 14 um (See Fig. 1A and col. 31, lines 30-48).

Regarding claim 10, Marshall discloses the thermal imaging of target surface(s) can occur in sunlight when the first infrared band pass filter is interposed in the optical path (col. 39, lines 16-24).

Regarding claim 11, Marshall discloses the device wherein the spectral band width of the second band pass filter is in a range of about 3.8 to 4.0 um (col. 31, lines 30-48).

Regarding claim 12, Marshall discloses the device wherein the spectral bandwidth of the second band pass filter is in a range of about 4.8 to 5.2 um (col. 31, lines 30-48).

Regarding claim 13, Marshall discloses the device wherein the spectral bandwidth of the second band pass filter is in a range of about 6.7 to 6.9 um (col. 31, lines 30-48).

3. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Marshall et al (US 6,515,285 B1), Ariessohn et al (US RE 33,857)* and *Cole et al (US RE37,146 E)* as applied to claim 1 above, and further in view of *Wood et al (US 5,675,149 A).*

Regarding claims 3-5, Marshall discloses a device for thermal imaging of target surface(s) having different temperatures within a range of temperatures of interest (col. 36, lines 9-16), the thermal imaging taking place through intervening media having a known transmission wavelength, the target surface(s) having a known absorptive wavelength (Fig. 1A and col. 6, lines 11-17), comprising: (a) a housing (76) including an opening (i.e. window) (88) for admitting infrared rays including those emanating from the target surface(s) (200), the rays directed along an optical path within the housing, the optical path having an optical axis; (b) an optical assembly (106) positioned within the housing (76) and in the optical path, the optical assembly having an input and output, the infrared rays (241) directed towards and into the input, through the out of the output of the optical assembly (See Fig. 1A and col. 11, lines 35-53); (c) means for optimizing the spectral band width of the optical assembly to 3 um to 14 um (col. 31, lines 30-48); (d) an un-cooled focal plane array (102), infrared ray detector (UFPA) including a detecting surface, the UFPA detector positioned in the housing and in the optical path so as to allow the impingement of the infrared rays passing out of the optical assembly onto the detecting surface (See Fig. 1D and col. 10, lines 34-53); (e) means for optimizing the spectral band width of the UFPA detector to 3 um to 14 um (col. 31, lines 30-48); said UFPA detector providing an electrical output proportional to the energy of the infrared rays impinging onto the detecting surface (See Fig. 1D and col. 10, lines 34-53); (filtering means (236) including a first and second infrared band pass filter, the first infrared band pass filter having a spectral band width of 8 to 14 um, the second infrared band pass filter having a respective spectral band width within 3 to 8 um (col. 31, lines

30-48), each of the band pass filters removably interposed in the optical path upon direction of an operator for filtering the infrared rays entering the housing so as to attenuate certain infrared rays and to pass other infrared rays of particular, respective predetermined wavelengths associated with the range of temperatures of interest, the transmission wavelength of the intervening media and the absorptive wavelength of the target surface(s) (col. 39, lines 33-42); and (g) electronic means (116) adapted to convert the electrical output into at least one interpretable output whereby an operator is presented with information sufficient to determine the temperature(s) of the target surface(s) within an acceptable degree of accuracy (See Figs. 28A-28C and col. 34, lines 7-31). Marshall, Ariessohn nor Taboada disclose an antireflection coating on each lens. Wood discloses a compact thermal camera wherein for optimizing the spectral band width of the optical assembly in a range of about 3 um to 14 um includes each lens, made of germanium, having an anti-reflection coating with a spectral band width of 3 um to 14 um (col. 2, lines 47-56). Wood teaches the range of sensitive wavelengths is limited to those wavelengths effectively transmitted by the lens (42) and package window 16. Although those skilled in the art recognize that improved transmission coatings will increase the effective wavelengths in the future in the current embodiment, the lens is a 4.28 cm focal length germanium lens (42), with anti-reflection coatings to efficiently transmit 8 to 12 um wavelengths. The package window (16) is germanium, also with anti reflective coating to efficiently transmit 8 to 12 um wavelengths (col. 2, lines 47-56). Therefore, it would have been obvious to modify the system disclosed by Marshall, Ariessohn and Taboada to include an anti-reflection coating on the lens, as

disclosed supra by Wood, to allow for a more efficient means of detecting temperature of the target surface(s) with a degree of accuracy.

4. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall et al (US 6,515,285 B1) in view of Ariessohn et al (US RE 33,857), Cole et al (US RE37,146 E) and Wood et al (US 5,675,149 A).

Regarding claim 14, Marshall discloses a device for thermal imaging of target surface(s) having different temperatures within a range of temperatures of interest (col. 36, lines 9-16), the thermal imaging taking place through intervening media having a known transmission wavelength, the target surface(s) having a known absorptive wavelength (Fig. 1A and col. 6, lines 11-17), comprising: (a) a housing (76) including an opening (i.e. window) (88) for admitting infrared rays including those emanating from the target surface(s) (200), the rays directed along an optical path within the housing, the optical path having an optical axis; (b) an optical assembly (106) positioned within the housing (76) and in the optical path, the optical assembly having an input and output, the infrared rays (241) directed towards and into the input, through the out of the output of the optical assembly (See Fig. 1A and col. 11, lines 35-53) the optical assembly including lenses (i.e. objective lens, negative lens, and focusing lens means) (col. 11, lines 47-53 and col. 34, lines 50-67); (c) means for optimizing the spectral band width of the optical assembly to 3 um to 14 um (col. 31, lines 30-48); (d) an un-cooled focal plane array (102), infrared ray detector (UFPA) including a detecting surface, the UFPA detector positioned in the housing and in the optical path so as to allow the impingement of the infrared rays passing out of the optical assembly onto the detecting

surface (See Fig. 1D and col. 10, lines 34-53); (e) means for optimizing the spectral band width of the UFPA detector to 3 um to 14 um (col. 31, lines 30-48); said UFPA detector providing an electrical output proportional to the energy of the infrared rays impinging onto the detecting surface (See Fig. 1D and col. 10, lines 34-53); (filtering means (236) including a first and second infrared band pass filter, the first infrared band pass filter having a spectral band width of 8 to 14 um, the second infrared band pass filter having a respective spectral band width within 3 to 8 um (col. 31, lines 30-48), each of the band pass filters removably interposed in the optical path upon direction of an operator for filtering the infrared rays entering the housing so as to attenuate certain infrared rays and to pass other infrared rays of particular, respective predetermined wavelengths associated with the range of temperatures of interest, the transmission wavelength of the intervening media and the absorptive wavelength of the target surface(s) (col. 39, lines 33-42); and (g) electronic means (116) adapted to convert the electrical output into at least one interpretable output whereby an operator is presented with information sufficient to determine the temperature(s) of the target surface(s) within an acceptable degree of accuracy (See Figs. 28A-28C and col. 34, lines 7-31). Marshall does not disclose a specific range of temperature of interest or of an anti-reflective coating. Ariessohn discloses an apparatus of imaging hot infrared emitting surfaces comprising: thermal imaging of target surfaces having different temperatures within a range of temperatures of interest of 1100-1300 degrees Celsius. Ariessohn teaches a number of imaging systems have been developed for viewing interiors of closed, hot vessels other than recovery boilers, to determine some internal

characteristics or conditions. In recovery boiler, typical smelt bed temperatures are about 1000 degrees Celsius with overlying combustion gases at temperatures of 1100 to 1300 degrees Celsius (col. 2, lines 50-60). Cole discloses an array for projecting thermal images comprising a large operating temperature range via: low negative thermal coefficient or resistance in the 20-650 degree Kelvin temperature range (col. 2, lines 24-36). Cole teaches a large operating temperature range via: low negative thermal coefficient of resistance (TCR) in the 20-650 degree Kelvin temperature range is ideally suited to a drive mode of projection driven by electrical current, the pixel resistance of about 40 kOhms provides optimal heating at low electrical current levels, and the emitter material has a resistance of about 1 kOhm per square, thereby permitting use of a 40 square serpentine pattern which fits into the small pixel geometry (col. 2, lines 24-36). Wood discloses a compact thermal camera wherein for optimizing the spectral band width of the optical assembly in a range of about 3 um to 14 um includes each lens, made of germanium, having an anti-reflection coating with a spectral band width of 3 um to 14 um (col. 2, lines 47-56). Wood teaches the range of sensitive wavelengths is limited to those wavelengths effectively transmitted by the lens (42) and package window 16. Although those skilled in the art recognize that improved transmission coatings will increase the effective wavelengths in the future in the current embodiment, the lens is a 4.28 cm focal length germanium lens (42), with anti-reflection coatings to efficiently transmit 8 to 12 um wavelengths. The package window (16) is germanium, also with anti reflective coating to efficiently transmit 8 to 12 um wavelengths (col. 2, lines 47-56). Therefore, it would have been obvious to modify the

device disclosed by Marshall to include a temperature ranging between a negative temperature range, as disclosed supra by Cole, to a high positive temperature range as disclosed supra by Ariessohn, and an anti-reflection coating on the lens, as disclosed supra by Wood, to allow for a more efficient means for thermal imaging of target surface(s) depending on the overall interests of the target surface(s).

Regarding claim 15, Marshall discloses the thermal imaging of target surface(s) can occur in sunlight when the first infrared band pass filter is interposed in the optical path (col. 39, lines 16-24).

Regarding claim 16, Marshall discloses the device wherein the spectral band width of the second band pass filter is in a range of about 3.8 to 4.0 um (col. 31, lines 30-48).

Regarding claim 17, Marshall discloses the device wherein the spectral bandwidth of the second band pass filter is in a range of about 4.8 to 5.2 um (col. 31, lines 30-48).

Regarding claim 18, Marshall discloses the device wherein the spectral bandwidth of the second band pass filter is in a range of about 6.7 to 6.9 um (col. 31, lines 30-48).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Boosalis whose telephone number is 571-272-

2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FB

OTILIA GABOR
PRIMARY EXAMINER